DISTRIBUTED SYSTEM FOR CONDUCTING PHYSICAL DELIVERY MAIL SERVICE OVER THE INTERNET

BACKGROUND OF THE INVENTION

This invention relates generally to a mail delivery system conducted in part over a wide area network (WAN) and more particularly to an integrated system for enabling users to transmit messages electronically over the Internet, redirecting the electronic message to an appropriate printing service, and effecting physical delivery of the printed message to the intended recipient at the recipient's physical address.

Traditional mail service, such as that offered by the United States Postal Service, allows users to send physical objects from a sender to a recipient. If a sender wishes to send a greeting card to a relative, for instance, the sender typically purchases the preprinted card from a store, writes a personal message within the card, places the card in an envelope addressed to the recipient, and drops the sealed and stamped envelope in a mailbox. At his point, the mail service collects the envelope from the mailbox, transports the mail to a Post Office where human beings or, more recently, electronic sorting equipment physically distributes the envelopes by destination. Once the destination of the envelope is known (the recipient's address), the envelope is physically transported by various means to a Post Office which services the recipient's address.

The time required to deliver mail increases with the distance between the sender's Post Office and the recipient's Post Office. The delivery time is further affected by the status of either of the Post Offices – i.e. whether it is "hub" that can transfer mail directly to the desired recipient Post Office. In this way, the organization of Post Office branches is like the airport system whereby the further two locations are from one (anther) the longer the flight time; whereby the flight time increases if an airline passenger is required to make several indirect stops on the way to his or her final destination.

The advent of the Internet has made it possible to send and receive messages electronically using a system called "e-mail". Instead of physical addresses, e-mail addresses are used which uniquely identify a person or group that shares a particular e-mail account. As e-mail is electronic, messages can be sent nearly instantaneously from one e-mail account to another at the touch of a button. Typically, a user's e-mail account is stored on a server that is coupled to the Internet. The e-mail recipient need not be logged-in to his e-mail account or even his computer. Instead, the e-mail is stored for later retrieval at the recipient's convenience.

E-mail has several advantages over traditional physical mail service. First, e-mail can be delivered much more quickly owning to the electronic nature of the message. Second, e-mail is much more economical to deliver since the digital signals which make up the e-mail are much easier to transport over long distances (as long as the Internet infrastructure is in place) than a physical object such as a package. Finally, an e-mail message can easily be delivered to more than one recipient by simply typing in additional e-mail addresses – no additional physical copies of the message, extra envelopes or stamps are necessary.

E-mail does have some drawbacks compared to traditional mail service. First, e-mail requires that both the sender and the recipient have (or have access to) a computer. While everyone has a physical address where they are located or can receive physical mail, not everyone has access to a computer and only a subset of those people actually have an e-mail account. Second, the tactile satisfaction of receiving a physical message such as a greeting card is lost. Instead, a recipient would be required to print the e-mail message to a local printer connected to the recipient's computer that accessed the e-mail account. Unless the recipient had access to a professional printer costing many thousands of dollars, it would be impossible to obtain the same quality as from store-bought cards. Even if the recipient were able to print out the message, the printing cost (especially if a full color message) might equal or exceed the cost of the stamp to send the message by regular mail.

One method proposed to create mail objects from e-mail messages is described in U.S. Patent No. 5,805,810 to Maxwell in which a NetGram system receives e-mails addressed to the netgram.com domain, translates the recipient address into a physical delivery address based upon a database linked to the particular sender, and prints the e-mail contents and physical address for mailing within the U.S. Postal Service. Although the system and methods described within the '810 patent can allow one to avoid using international postal services by having the e-mails printed and mailed within the destination country, it still requires that postal fees be paid by the sender and a complicated e-mail verification scheme.

Accordingly, a need remains for a mailing system that integrates the advantages of both the Internet and the web (World Wide Web) with that of the more traditional mail services to improve the dissemination of information from senders to recipients.

SUMMARY OF THE INVENTION

A mail delivery system constructed according to a preferred embodiment of the present invention is comprised of a service pod for receiving and processing electronic messages from a sender and a plurality of printing stations, a selected one of which is adapted to receive the

processed message from the service pod and print the message and related materials on printable medium. The printed and addressed message is then delivered to the Post Office or similar physical mail delivery service which then delivers the message to the intended recipient designated by the sender. The service pod includes a query engine in two-way communication with LPF servers at each of the printing stations over a wide-area-network (WAN) such as the Internet to dynamically determine the appropriateness (in terms of capability, capacity, etc.) of the particular print station to complete and deliver to the Post Office a particular print job. The service pod further includes an ad compiler and mail object builder adapted to insert targeted advertising within the electronic message and arrange the advertising, any additional value-added content, the message, and destination address, into a formatted mail object to be printed. Advertisements are selected based upon recipient demographics stored internally at the service pod and externally available through known information sources, and upon ad affinity with other advertisements that may be presented together in the same mail object. In an alternate method for selecting advertisements for printing on the printed object, records within a recipient database at the service pod site can be accessed to determine a historical record of which advertisements have already been sent to avoid duplication. Advertisements can also be manually selected by the mail sender to supplement the printing and mailing costs of the mail object.

The foregoing and other objects, features and advantages of the invention will become more readily apparent from the following detailed description of a preferred embodiment of the invention that proceeds with reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating an electronic message to physical mail delivery system according to a preferred embodiment of the invention.

FIG. 2 is a block diagram of software components of the Zairmail system.

FIG. 3 is a flow diagram of the query engine shown in FIG. 2 adapted to select an appropriate local production facility (LPF) according to a preferred embodiment of the invention

FIG. 4 is a block diagram of software components of the Zairmail mail object compiler implemented according to a preferred embodiment of the invention.

FIG. 5 is a flow diagram illustrating the process steps for selecting appropriate directed advertising content to include within the mail object.

FIG. 6A-6E are lists of advertisers sorted according to one embodiment of the invention.

FIG. 7A-7D illustrate different arrangements in which advertisements can be placed on printed matter according to the invention.

FIG. 8 is a block diagram of an LPF according to a preferred embodiment of the invention.

DETAILED DESCRIPTION

FIG. 1 is a block diagram of an electronic message to physical mail delivery system 10 implemented according to a preferred embodiment of the invention. The system contemplates a mail sender 12 preparing an electronic message which is then processed, shunted to an appropriate printing facility (chosen based on such attributes as proximity to the intended recipient of the message, capacity, capability, etc.), and then printed out by system 14 (Zairmail system). A printed mail object including the message is then delivered to the postal service 16 or other like organization/company for physical delivery of the printed object to the intended mail recipient 18. Although the invention is directed primarily to traditional printed messages, the system herein described can be used in conjunction with any items on which specified printed materials appear, such as T-shirts, posters, mugs, etc.

System 10 contemplates supplementing mailing costs through advertising content from advertisers 20 placed within the printed mail object. The selection and placement of appropriate advertisements within the printed message forms an additional portion of the inventive physical mail delivery system 10 and is described in more detail below with reference to FIGs. 5, 6A-6E, and 7A-7D. Further content can be added to the message supplied from value-added content providers 22. The value-added content to the message can for example include limited edition artwork, joke or cartoon of the day, crossword puzzles, and others. As contemplated within an embodiment of the invention, the mail sender 12 can accumulate points for using the Zairmail system which can then be exchanged for goods or services, as from gift supply partners 24, advertisers 20, or others.

The mail sender 12 can compose and send messages electronically to the Zairmail system 14 in three different formats. Referring to FIG. 2, the message can be intercepted at an intermediate node such as message transfer handler 26 of the Zairmail system 14 by an e-mail subsystem 28, via web site interface 30, or through the printer driver interface 31.

Turning first to the e-mail interface, a user composes an e-mail message and addresses the e-mail to a recipient at a particular domain, e.g. mom@Z..irmail.com. The e-mail message sender is identified by the "From" line of the e-mail message and the recipient's physical address and other demographic statistics are looked up in a user database 32. The particulars of

this type of physical address look-up system are not disclosed here as such a system can be constructed with reference to U.S. Patent No. 5,805,810.

The second type of interface contemplates a mail sender logging onto a Web site located on a server of the Zairmail system 14. The mail sender can store a personalized address book within a user database 32 for use and retrieval later. Once logged on to the system, the user is presented with a blank form in which he or she can designate a recipient, the text of the message, select whether and which advertisements to include within the printed mail object, select whether to send printable coupons, and other items. Delivery options, such as certified mail, registered mail, overnight or immediate delivery, or message archiving, can also be specified by the Zairmail system user.

The printer driver interface 31 interacts with printer drivers downloaded to the user's machine. Any printing to the devices represented by Zairmail printer drivers will be sent to the printer driver interface for processing. The users can use any one of their desktop applications to compose a message, and print it to the Zairmail printer. When the user is connected to the Internet, the Zairmail printer drivers will then connect to the printer driver interface 31 and transmit the message on to service pod 34.

The service pod 34 operates to select the appropriate Local Production Facility (LPF) to which the electronic message is shunted and ultimately printed out for mailing with the U.S. Post Office or similar physical mail delivery service. The service pod includes user database 32, a recipient database 36 and a query engine 38. The user database 32 includes address book information for the mail sender 12 in order to generate physical address information used by the query engine. The user database can store archived messages sent over a particular time period. The recipient database 36 includes information on the recipient such as personal demographics and whether that particular recipient has opted to block messages sent through the Zairmail system 14, block certain advertisements from being attached to messages sent through the Zairmail system, or block messages sent from a particular user of the Zairmail system. Demographic information for the receiver is compiled internally, as by querying the receiver's profile as listed within the user database 32, and externally from external data sources such as those available through Experian Information Solutions, Inc. Information within the recipient database is periodically queried to generate accompanying printed material with the electronic message, such as directed advertisements, as discussed further below.

Query engine 38 operates to query distributed LPFs, such as LPF 40 and 42, geographically separated within LPF space 44, and determine their appropriateness for the job of printing the electronic message in physical form. By way of example, LPF 40 may be located

in San Francisco while FPF 42 may be located in New York City. In the alternative, the LPFs may be located in different countries so that an electronic message originating within one country can be printed and mailed in the recipient's country in order to avoid air-mail charges. Mail printed and mailed at a post office proximate to the recipient's physical address will often result in improved delivery times since cross-country transport of the physical mail object would not then be necessary. In this way, the electronic message may be quickly and inexpensively delivered via a physical mail delivery system.

It must be noted that the actual physical proximity of the LPFs to the destination address may not actually result in the fastest delivery time. There may be expedited means of transferring mail from other LPFs to the destination, based on perhaps scheduled point-to-point flights from LPF location to the destination location. So, if the messages are printed in an LPF within the cutoff time of reaching the scheduled flight, we might be able to deliver the messages faster than sending the message to an LPF that would miss the next day delivery deadlines.

FIG. 3 illustrates steps undertaken by the query engine 38 to determine the most appropriate LPF. A candidate list of possible LPFs is compiled in step 46. These are LPFs with the type of equipment available, such as shown in FIG. 8, to communicate with the mail object builder 92 of FIG. 4 and are typically included within a static table stored within memory of the query engine. The list can be further limited to only those LPFs within a certain distance of the recipient's address or some other factor such as expedited delivery mechanisms. The query engine 38 then queries each candidate LPF to determine whether it is appropriate for the printing job. The first LPF candidate is queried in step 48. The query is a request for information regarding the current capacity and capabilities of the LPF – attributes that may change over time and cannot necessarily be quantified in a static table. The first LPF is given a certain amount of time to respond to the electronic query in step 50. If it does not respond within the allotted time, the LPF is taken off the candidate list in step 52. If it does respond, then the requested information is retrieved in step 54, and processed in later steps to determine a "goodness factor" as disclosed below. If not all LPFs on the list have been queried as determined within step 56, then the process moves to step 58 in which the next LPF on the list is queried. The process continues until a modified candidate list is generated and information from each of the LPFs on the list retrieved. If it is determined in step 56 that all LPFs on the candidate list have been queried, then the process moves to step 60. All LPFs can likewise be queried simultaneously using a message broadcast to each of the LPFs so that development of the modified candidate list can be done in parallel.

In step 60, a "goodness factor" is determined for each LPF on the modified candidate list based upon attributes of the LPF that might affect that LPF's ability to successfully carry out the requested print job on time. Examples of such attributes include proximity to the deliver point (zip code), the capability of the printers and other facilities in the LPF (can it actually do the job, e.g., print materials [paper, T-shirts, posters] with the appropriate color and size available), the LPF capacity (the estimated lag time for job completion), the cost bid by the LPF per impression, and the shipping capability to the post office (how fast the printed mail object can be delivered to the post office). The ideal LPF would be the closest, physically or by means of expedited delivery mechanisms, to one to the final destination with the right equipment and supplies to complete the job and a very low time-to-print lag. Less desirable LPF factors that are communicated to the query engine responsive to the LPF query can include situations where the LPF is down either because of equipment failure or connectivity problems, the LPF may be loaded down with lots of jobs, the LPF may not have the proper facilities and/or supplies to complete the print job, and the vehicles and people may not be available to deliver the messages to the Post Office. An enhanced implementation of an LPF selection for larger jobs could be that LPFs may compete for a particular job based on available (otherwise wasted) capacity and capability as well as having "insert" advertisements that need to be sent for high-paying advertisers.

The cost attribute can be changed by the LPF operator via a web interface with service pod 34 to change one or more static attributes stored within and considered by the query engine 38 when selecting the appropriate LPF to send the print order to. In the alternative, the LPF operator can enter or modify the cost attribute (e.g. the amount of money the LPF will charge to complete a certain task such as printing a full color, two-sided greeting card, sorting, processing, stamping, and delivering to the Post Office) locally at the LPF server 96, which communicates with the service pod 34. The LPF attributes are stored within an attribute database at the LPF server responsive to automatic queries within the local network of equipment at the LPF site as well as manually entered data. For instance, if an LPF facility is running at low capacity, the LPF operator can lower his bid to complete certain types of jobs, thereby increasing his LPF's goodness factor and improving the chance that his LPF will be selected to perform a certain print command by the query engine 38.

Once the goodness factor has been calculated for each LPF in step 60, the LPFs on the modified candidate list are sorted in step 62 to determine the LPF with the highest goodness factor – that is, the most appropriate LPF for the print job and delivery of the printed mail object

to the post office. The print order (compiled according to the methods and systems described below) is then sent electronically to the top ranked LPF in step 64.

The advantage of such a querying system over prior art systems, such as in U.S. Pat. No. 5,805,810, is that many dynamic factors can be taken into consideration before shunting the print order to the appropriate LPF. In this was, the present system will not send messages for printing to print facilities that are off-line, without capacity, or without the capabilities to carry out the job. The Netgram-based transmission system, for instance, will keep attempting to deliver to the off-line print facility until the facility is again operational or a time-out occurs, in which case the message may not ultimately be delivered, or delivered late.

FIG. 4 illustrates in block diagrams the components for building the mail object. The ad compiler is shown at 66 and includes an advertisement image database 68, an advertisement ID database 70, ad counter 72, and an ad selector 74. The advertisement image database 68 stores the graphical representations of advertisements and can be accessed and updated with new images by advertiser users with the proper permissions as described in more detail below. The advertisement ID database associates in a lookup table each image with an ID number so that when the mail object is constructed and electronically transmitted to the LPF for printing, the size of the transmitted mail object can be reduced since the ID and not the graphic image file only need be transmitted. As will be appreciated, the graphic images are stored locally at the LPFs so that the proper images can be substituted where indicated by the ID immediately prior to printing. The ad counter 72 compiles statistics from the ad selector to keep track of how many of each advertisement is used and to complete accounting so that the particular advertiser can be charged.

The ad compiler is coupled to an ad order processor 76 that operates as follows. A participating advertiser will login and the Zairmail system will authenticate their user ID and password. Each advertiser can have multiple groups, each with different permissions. Each group can further have multiple users, each of those with different permissions. Permissions will apply on a personal, group, or advertiser basis. Within each of these groups, "read", "modify", "delete", and "order" permissions will be available. Each advertiser must have at least one super-user – a user who has full privilege to read, modify, delete, or order. The super-user is responsible for adding or deleting users, and assigning permissions, for pre-approved corporate accounts. An advertiser user can, with the proper permissions, place or change orders corresponding to the preferred target market the advertiser would like to direct their marketing to, the price they are willing to pay for advertising directly to a particular mail recipient (supplementing the mailing costs), or to change the advertising graphics stored within the ad

image database 68. The advertising user can select demographic variables, time frames in which the advertisement is active, and the maximum number of impressions per receiver and over a particular time-frame. By way of example, an advertiser for a luxury car company can choose to advertise only to those individuals living in ZIP codes wherein the average home prices is over $300,000. By using both internal and external databases, such limitations can be addressed. Advertiser-set limits are stored within the ad selector 74 and used in the processing steps discussed below to select the most appropriate and lucrative advertising content to include within the mail object.

The ad selector 74 operates in conjunction with the advertisement databases 68, 70 and ad counter 72 to determine which advertisements will be printed. The ad selector can also operate in conjunction with the recipient database to prevent repeat impressions of the same advertisement with the same recipient within a certain period of time. One method for selecting advertisements is shown in FIG. 5 in which the universe of ready advertisements stored in the system are identified in step 78. These ready advertisements are those that have not expired, with a current print count stored within the counter 72 less than the print count paid for by the advertiser. Each advertisement has a base priority associated with it (step 80) that, for instance, can be based on how much the advertiser has paid for the space. The higher the amount paid, the higher the priority. Size of the advertisement can be factored in to this base priority as well as well as factors considering whether certain ads are set to expire sooner than others (so that the ad limits can be used prior to expiration). This base priority can be modified in step 82 according to how closely the mail recipient 18 matches the target market preselected by the advertiser through the ad order processor 76. The ready ads are sorted by their modified priority in step 84 to yield a modified ad list.

Finally, the ads on the modified ad list are sorted a second time by ad affinity in step 86. Ad affinity operates by, for instance, looking at the ads located above and below the particular ad on the modified list and apply preestablished factors based, not on the designated mail recipient, but on the advertisements that would also appear on the mail object with the one ad. For instance, the listing of an advertisement for a clothing store in the top slot of the modified list may act to negatively affect the co-listing on the mail object of an ad for a competing clothing store. Likewise, an ad for a health food store can elect not to ever be listed with advertisements for alcohol or tobacco products. Ad affinity can also be established to positively influence the chance that a certain type of advertisement, such as a car rental ad, will be paired with another type of ad, such as an airline ad, in either the same mail object or to the same recipient over a period of time.

Other factors that can affect the priority is the willingness of an advertiser to "bid-up" for a spot – meaning whether an advertiser has indicated within the ad order processor 76 that placement of certain ads to certain types of people are worth more than others. This is indicated as one of the attributes of the advertisement as well as what the bid increments are and the ceiling value for the bid. If no ads match the demographics for a particular recipient, the ad compiler 86 operates in one embodiment of the invention to pick from low-priority or default advertisers that pay very little or non-profit, community service or interesting articles, that are willing to wait until no other high-paying ads are competing for the space.

One issue that may occur under the present system is starvation – that is, the chance that certain low-bid ads will never be printed and may be intentionally locked out by competing advertisers. A "fairness" routine is then employed by the ad compiler 66 to ensure that a few number of very high-paying advertisers cannot block other advertisements from being printed. One example of an implementation of the fairness routing is where the base priority of all losing advertisements are incremented so that their chance of being chosen in a subsequent selection round is increased. An alternative is providing a "rest-period" for advertisements, where after a certain number of "wins", the advertisements are taken out of the ready advertisements group and are required to rest for a few rounds before they are again qualified to participate in the ad selection process.

Once the modified list is reorganized by factoring in ad affinity, then the appropriate number of ads are selected and placed on the mail object document in step 88 and the ad counter 72 is updated in step 90 to reflect that certain ads were used. It should be noted that similar ad selection processes can be used in selecting advertisements for display on a web page, as in a banner ad, and should not be limited simply to print advertisements.

The tables in FIGs. 6A-6E illustrate how ad affinity may be applied according to one embodiment of the invention. A basic ad list, sorted according to base priority, is shown in FIG. 6A. FIGs. 6B and 6D show a modified list sorted responsive to demographics known about the mail recipient. In the examples shown, FIG. 6B is a modified ad list targeted at a sixteen year old male; while FIG. 6D is a modified ad list targeted at a 35 year old female. Note, for instance, that the ads are skewed toward the interests of the particular demographic – FIG. 6B having two videogame listings in the top eight ads and FIG. 6D having the top two spots taken by clothing advertisements. FIGs. 6C and 6E show the modified list of FIGs. 6B and 6D, respectively, as further modified by ad affinity. In FIG. 6C, for instance, the VideoGame#2 ad was not rejected on affinity because the video game advertiser did not specify the rejection. However, the ClothingStore#1 ad was dropped from the list because the advertiser for

ClothingStore#2 chose not to be listed with another clothing advertisement. Similarly, in FIG. 6E, the ClothingStore#1 advertisement in the top spot specified an affinity rejection of the ClothingStore#2 advertisement which was dropped from the list and the remaining advertisements consequently are moved up on the list.

Turning back to FIG. 4, the selected advertisement IDs, any value-added content the message and the recipient's address are sent to the mail object builder 92 so that the various components can be arranged on a page. An example of how certain selected advertisements can be arranged on a page of a printed mail object is shown in FIG. 7A. Once the type and designated number of advertisements are selected, they are placed on the mail object which in this case comprises a standard sheet of letter sized paper. FIG. 7A shows three advertisements arranged about the space containing the text of the electronic message. FIG. 7B shows a full page ad view. FIG. 7C shows two half-page advertisements. And FIG. 7D shows one half page and two quarter page advertisements. Each position and size on the page can have an associated price that is applied to the mailing costs to supplement or completely eliminate the mailing costs required of the mail sender. Once arranged in a printable format, such as by constructing a file using any standard desktop publishing program, the mail object is sent along with a print order to the LPF designated in step 64.

FIG. 8 is an example of an LPF server, including a router 94 through which information is exchanged with the service pod 34 (FIG. 2) and mail object builder 92 (FIG. 4). An LPF server 96 includes a storage system on which advertisement graphics files are located associated with the advertisement ID numbers included with the mail object. Also included on LPF server is an attribute processor (not shown) that periodically queries over the network bus 98 the status and capabilities of the print server 100 and other external and internal attributes requested by the service pod 34. The print order from the mail object builder 92 (FIG. 4) is processed by the LPF server, including inserting advertisement and other graphics where indicated on the mail object document, to form a printable mail object. Such an object is sent to the print server 100 where it is shunted to one of the printers 102, 104 with the capability of printing the mail object as requested. Once printed out, the mail object is addressed and sealed in an envelope and carried to the local post office for delivery by normal land-based means to the intended mail recipient.

The LPF software will use all available techniques to achieve as much discounts as possible for each message. The messages will be sorted based on local delivery regulations and guidelines for maximum discounts and delivery accuracy. Such technologies are: CASS (Code Accuracy Support System) where each address is checked and verified to be a valid address, PAVE (Presort Accuracy, Validation, and Evaluation) to pre-sort the addresses for expedited

delivery and maximum discount, ACS (Address Correction Service), and NCOA (National Change of Address).

Now that the individual components of the Zairmail system have been described, attention is given back to FIG. 1. The mail sender 12 is serviced by the Zairmail system 14 by allowing electronically composed messages to be sent to a recipient who can receive physical mail but may not have the ability to receive the electronic message in its native form. "Frequent user points" may be awarded based upon the number of messages sent, where points can be exchanged later for other goods and services. The mail sender 12 interacts with advertisers 20 by viewing the ads selected for placement on the mail object. the sender has the option of previewing the ads and choosing if the ads should be sent or not to the recipients – thus, these ads are also viewed by the mail recipient 18. Should the receiver purchase products from the advertise responsive to advertising directed to the mail recipient at the mail sender's behalf, the mail sender can receiver additions "frequent user points" or gifts. The value-added content suppliers 22 gain exposure and, in some cases, payment for the content they provide while the Zairmail system 14 gains increased mail volume by providing more attractive content for its mail users. Advertisers 20 gain market data and impressions at their Web site while the Zairmail system gains ad content and, most importantly, exchanges ad exposure for money to supplement and sometimes exceed the costs of the printing and mailing costs.

In addition to using value-added content and artwork to drive volume, other promotional tools can be used. In one example, frequent mailer contests will award gifts to those users who mail at least a certain number of messages. In another example, each message sent through the system according to the invention can include a puzzle piece that can be collected and combined with other puzzle pieces to win a prize. This promotion can be applied to the mail sender as well.

Having described and illustrated the principles of the invention in a preferred embodiment thereof, it should be apparent that the invention can be modified in arrangement and detail without departing from such principles. We claim all modifications and variation coming within the spirit and scope of the following claims.